

CLAIMS

What is claimed is:

1. A solar cell structure comprising:
a solar cell comprising two semiconductor layers in facing contact with each other, wherein the semiconductor layers comprise a semiconductor junction producing a voltage between the two semiconductor layers when illuminated; and
a shunt comprising a channel of an altered material
extending between and at least partially through the two semiconductor layers, and
having an asymmetric current-voltage characteristic of passing a small current when voltage-biased in a forward direction parallel to the channel, and passing a large current when voltage-biased in a reverse direction parallel to the channel and opposite to the forward direction.
2. The solar cell structure of claim 1, wherein the altered material is a proton-irradiated altered material.
3. The solar cell structure of claim 1, wherein the altered material is a doped altered material.
4. The solar cell structure of claim 1, wherein the solar cell comprises more than two semiconductor layers, and wherein the shunt extends between and at least partially through at least two of the semiconductor layers.
5. The solar cell structure of claim 1, wherein the solar cell comprises more than two semiconductor layers, and wherein the shunt extends between and at least partially through at least three of the semiconductor layers.
6. The solar cell structure of claim 1, wherein the shunt comprises a plurality of channels spaced apart from each other over a front-side surface of the solar cell.

7. The solar cell structure of claim 1, wherein the solar cell structure comprises a plurality of electrically interconnected solar cells as recited in claim 1, with each solar cell having a shunt as recited in claim 1.

8. A method for fabricating a solar cell structure, comprising the steps of depositing a solar cell comprising two semiconductor layers in facing contact with each other, wherein the semiconductor layers comprise a semiconductor junction producing a voltage between the two semiconductor layers when illuminated; forming a shunt comprising a channel of an altered material extending between and at least partially through the two semiconductor layers, and having an asymmetric current-voltage characteristic of passing a small current when voltage-biased in a forward direction parallel to the channel, and passing a large current when voltage-biased in a reverse direction parallel to the channel and opposite to the forward direction.

9. The method of claim 8, wherein the step of depositing includes the step of depositing more than two semiconductor layers, and the step of forming includes the step of forming the shunt to extend between and at least partially through at least two of the semiconductor layers.

10. The method of claim 8, wherein the step of depositing includes the step of depositing more than two semiconductor layers, and the step of forming includes the step of forming the shunt to extend between and at least partially through at least three of the semiconductor layers.

11. The method of claim 8, wherein the step of forming a shunt includes a step of directing a proton beam into the semiconductor layers.

12. The method of claim 8, wherein the step of forming a shunt includes a step of
doping the channel.
13. The method of claim 8, wherein the step of forming a shunt includes steps of
doping the channel by ion implantation, and
annealing the channel.
14. The method of claim 8, wherein the step of forming includes a step of
forming a plurality of channels spaced apart from each other over a front-side
surface of the solar cell.
15. The method of claim 8, including an additional step, to occur after the
step of forming the shunt is complete, of
placing the solar cell structure into service.